

Appl. No. 09/818,263
Amdt. Dated October 14, 2004
Reply to Office Action of June 14, 2004

Attorney Docket No. 81751.0011
Customer No. 26021

REMARKS

This application has been carefully reviewed in light of the Final Office Action dated June 14, 2004. Claims 1-4, 8-13, and 18-21 remain in this application. Claims 1, 10, and 18 are the independent Claims. Claims 1, 10, and 18 have been amended. Claims 5-7 and 14-17 have been cancelled without prejudice. It is believed that no new matter is involved in the amendments or arguments presented herein. Reconsideration and entrance of the amendment in the application are respectfully requested.

Art-Based Rejections

Claims 1-2, 8-11, and 18-21 were rejected under 35 USC §103(a) over EP0,558,059 (Ishizaki) in view of USPN 6,229,515 (Itoh). Claims 3-4 and 12-13 were rejected under 35 USC §103(a) over Ishizaki in view of Itoh and further in view of USPN 4,393,380 (Hosokawa). Applicant respectfully traverses the rejections and submits that the claims herein are patentable in light of the clarifying amendments above and the arguments below.

The Ishizaki Reference

The Ishizaki reference is directed to a liquid crystal display including a liquid crystal sealed between a pair of substrates. (*See, Ishizaki, abstract; Col. 3, lines 1-3*). According to Ishizaki the opposite electrodes are inverted and driven by the potential controlling device on the same substrate as the opposite electrodes. (*See, Ishizaki, abstract; Col. 3, lines 17-30*).

The Itoh Reference

The ancillary Itoh reference is directed to a liquid crystal display device having selection switching elements. (*See, Itoh, abstract; Col. 1, lines 5-7*). According to Itoh, when an image is to be displayed by scanning lines for which selection switching elements are provided, the scanning line selection order is

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arbitrarily determined and the polarities are reversed on the basis of the determination result so as not to form a bundle of scanning lines having the same polarity within each field. (*See, Itoh, abstract; Col. 4, lines 26-34*).

The Hosokawa Reference

The ancillary Hosokawa reference is directed to a matrix liquid crystal display circuit. (*See, Hosokawa, abstract*). Hosokawa teaches the use of a common driver with a shift register for performing a memory function. (*See, Hosokawa, Col. 7 line 35 to Col. 98, line 8*).

The Claims are Patentable Over the Applied References

The present invention is generally directed to a liquid crystal device and a method of driving the same.

As defined by amended independent Claim 1, a liquid crystal device includes M rows of scanning lines, and N columns of data lines. M is an integer equal to or greater than 2, and N is an integer equal to or greater than 2. M X N number of switching element are respectively connected to one of the M rows of scanning lines and one of the N columns of data lines. M X N number of pixel electrodes are respectively connected to one of the M X N number of switching element. M rows of opposite electrodes are arranged oppositely to respective rows of the M X N number of pixel electrodes through a liquid crystal layer. A scanning line driving circuit is configured to supply a scanning signal including a scanning period for sequentially selecting at least one of the M rows of scanning lines to the entire M rows of scanning lines in each of a plurality of subfields defined by dividing one field. A signal control circuit is configured to convert a data signal to a binary signal in each of the subfields. A data line driving circuit is configured to supply a binary voltage to the N columns of data lines based on the binary signal from the signal control circuit. A polarity inverting circuit is configured to invert a polarity of a voltage

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applied to the liquid crystal layer in synchronization with the scanning period by changing a voltage supplied to an opposite electrode of a row corresponding to the selected scanning line in each of the subfields.

The applied references of record do not disclose or suggest the above features of the present invention. In particular, the applied references do not teach or suggest, "a scanning line driving circuit configured to supply a scanning signal including a scanning period for sequentially selecting at least one of the M rows of scanning lines to the entire M rows of scanning lines in each of a plurality of subfields defined by dividing one field," as required by the claims of the present invention. Moreover, the applied references do not teach or suggest, "a polarity inverting circuit configured to invert a polarity of a voltage applied to the liquid crystal layer in synchronization with the scanning period by changing a voltage supplied to an opposite electrode of a row corresponding to the selected scanning line in each of the subfields," as required by the claims of the present invention.

Ishizaki is directed to a liquid crystal display having a liquid crystal sealed between a pair of substrates (*See, Ishizaki, abstract; Col. 3, lines 1-3*). According to Ishizaki, opposite electrodes are inverted and driven by the potential controlling device on the same substrate as the opposite electrodes. (*See, Ishizaki, Col. 3, lines 17-30*). Ishizaki discloses that opposite electrodes are divided into sections parallel with scanning lines, and the potential of each opposite-electrode section is inverted per line or per frame. (*See, Ishizaki, Col. 3, lines 25-29*). However, Ishizaki does not teach or suggest inverting the polarity of a voltage supplied to an opposite electrode in each of the subfields.

In contrast, amended independent Claim 1 requires "a polarity inverting circuit configured to invert a polarity of a voltage applied to the liquid crystal layer in synchronization with the scanning period by changing a voltage supplied to an opposite electrode of a row corresponding to the selected scanning line in each of the

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subfields." This results in a more efficient operation and less power consumption for the present invention compared to that of the prior art. (*See Specification, Page 29, lines 9-21*).

The ancillary Itoh reference does not remedy the deficiencies of Ishizaki. In Figs. 3, 6-7, 10-13, 22, 27-28, and 33, Itoh discloses that only particular scanning lines are selected with space in between. The portions with the diagonal lines indicate selected scanning lines in the respective subfields. Unlike the present invention, Itoh is silent about voltage being applied to a liquid crystal layer in each subfield is binary. In the present invention, as shown in Fig. 8, all the scanning lines are selected in each subfield, and, in relation to the gray scale data, one of voltage H and voltage L is applied to the liquid crystal layer in each subfield. Thus, with driving the subfields, Itoh is different from that disclosed in the present invention. Moreover, Itoh is silent about the scanning line driving circuit and the data line driving circuit of the present invention.

Further, the ancillary Hosokawa reference does not remedy the deficiencies of Ishizaki and Itoh.

Since the applied references do not disclose, teach, or suggest the above features of the present invention as recited in amended independent Claim 1, these references cannot be said to anticipate nor render obvious the invention which is the subject matter of that claim.

Accordingly, amended independent Claim 1 is believed to be in condition for allowance and such allowance is respectfully requested.

Applicant submits that amended independent Claims 10 and 18 are also patentable over the applied references of record for at least the same reasons as those discussed above in connection with amended independent Claim 1.

The remaining claims depend either directly or indirectly from amended independent Claims 1, 10, and 18, and recite additional features of the invention

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which are neither disclosed nor fairly suggested by the applied references and are, therefore, also believed to be in condition for allowance with such allowance being respectfully requested.

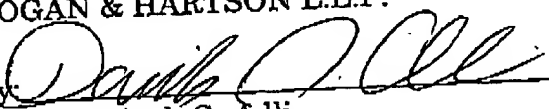
Conclusion

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6809 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

By 
Dariush G. Adli
Registration No. 51,386
Attorney for Applicant(s)

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500 South Grand Avenue, Suite 1900
Los Angeles, California 90071
Phone: 213-337-6700
Fax: 213-337-6701